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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER	
AKHAVANNIK, HUSSEIN	

ART UNIT	PAPER NUMBER
2621	15

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/441,294	HIGGINBOTTOM ET AL.	
	Examiner	Art Unit	
	Hussein Akhavannik	2621	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *20 October 2003*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-13 and 44-70* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *44 and 45* is/are allowed.

6)☒ Claim(s) *1-13 and 46-70* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *20 October 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. §§ 119 and 120

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

13)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

a) ☐ The translation of the foreign language provisional application has been received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____.
4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Response to Amendment

1. The amendments to claims 8 and 57 overcome the Examiner's objections cited in paragraphs 5-6 of the previous office action (now Paper No. 10).

Drawings

2. The drawings were received on 10/20/2003. These drawings are accepted.

Response to Arguments

3. Applicant's arguments with respect to claims 1, 4, and 9 have been considered but are moot in view of the new ground(s) of rejection.

The Applicant alleges that Donelly et al fail to disclose or suggest the feature of determining a plurality of comparison output values using logical AND operations and summing the comparison output values to determine a confidence level measure. The Examiner agrees that the comparing performed by Donelly et al between the determined set of spatial features and known set of spatial features does not determine a plurality of comparison output values using a summation of logical AND operations. However, Donelly et al do explain a comparator circuit used to determine the confidence level measure between an image and a plurality of templates using logical AND operations and summations of the output of the AND operations in column 12, line 33 to column 13, line 28. Donelly et al explain that the data value on an input bus (corresponding to a pixel value of one of the templates) is compared with a pixel value of an image and that the output is "ANDed" in column 13, lines 1-9. Donelly et al then explain that similar processing is performed for each column of the image pixel data, thereby corresponding to the "plurality of comparison output values, wherein each comparison output value is

determined by a logical AND operation". Donelly et al also explain that a tally (corresponding to a sum) of the comparator output values is retained in order to determine an occurrence of a template within the image pixel data. The template with the greatest similarity to the image pixel data will then correspond to the angle of rotation of the image (column 12, lines 42-45). Thus, the comparator circuit of Donelly et al aids in determining the set of spatial features used by Donelly et al to detect a predetermined mark in the image data. Furthermore, the confidence measure determination of Donelly et al between a determined set of spatial features and a known set of spatial features incorporates logical AND gates as illustrated in figure 43 by reference numbers 306 and 309 and explained in column 18, lines 59-67. Therefore, it would have been an obvious matter of design choice to modify the spatial feature comparison method of Donelly et al by having a plurality of comparison output values using logical AND operations and summing the comparison output values to determine a confidence level measure as explained by Donelly et al in the comparator circuit, since the Applicant has not disclosed that a plurality of comparison output values using logical AND operations solves any stated problem or is for any particular purpose and it appears that the method of Donelly et al would perform equally well in comparing the spatial features.

Allowable Subject Matter

4. Claims 44 and 45 are allowed.

The following is a statement of reasons for the indication of allowable subject matter:

The closest cited prior art (U.S. Patent No. 6,002,800) fails to teach or suggest the features of a signature comprising a plurality of radial signatures wherein each of the radial

signatures indicates a discrete angular distribution of a plurality of elements about a predetermined origin in view of the further limitations of independent claims 44 and 45.

5. Claims 7, 12, 46-56 and 58-60 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

7. Claims 1, 4, 9, and 61-70 are rejected under 35 U.S.C. 103(a) as being unpatentable over Donelly et al (U.S. Patent No. 6,002,800).

Referring to claims 1, 4, and 9,

a. Processing the image to provide an encoded representation of the image at a predetermined resolution is explained by Donelly et al in column 7, lines 40-43 and illustrated in figure 1 as the scanner (2).

b. Detecting coordinate positions for each of the elements of the mark embedded in the image by applying at least one mask is explained by Donelly et al in column 7, lines 8-15 and illustrated in figure 10. In figure 10, two templates are detected and each of their center points is determined in order to calculate the positional vector (58). The template, which corresponds to the mask explained by the applicant, is compared with the cells of the input image, which correspond to pixels.

c. Determining a set of spatial features representing a spatial arrangement of the detected elements is explained by Donelly et al in column 6, line 64 to column 7, line 7 and illustrated in figure 10. The spatial feature of the detected templates is the positional vector, which comprises of a length and direction.

d. Comparing the determined set of spatial features to a known set of spatial features to provide a plurality of comparison output values, wherein each comparison output value is determined by a logical AND operation is not explicitly explained by Donelly et al. However, Donelly et al do explain a comparator circuit used to determine the confidence level measure between an image and a plurality of templates using logical AND operations and summations of the output of the AND operations in column 12, line 33 to column 13, line 28. Donelly et al explain that the data value on an input bus (corresponding to a pixel value of one of the templates) is compared with a pixel value of an image and that the output is "ANDed" in column 13, lines 1-9. Donelly et al then explain that similar processing is performed for each column of the image pixel data, thereby corresponding to the "plurality of comparison output values, wherein each comparison output value is determined by a logical AND operation". Donelly et al also explain that a tally (corresponding to a sum) of the comparator output values is retained in order to determine an occurrence of a template within the image pixel data. The template with the greatest similarity to the image pixel data will then correspond to the angle of rotation of the image (column 12, lines 42-45). Thus, the comparator circuit of Donelly et al aids in determining the set of spatial features used by Donelly et al to detect a predetermined mark in the image data. Furthermore, the confidence measure

determination of Donelly et al between a determined set of spatial features and a known set of spatial features incorporates logical AND gates as illustrated in figure 43 by reference numbers 306 and 309 and explained in column 18, lines 59-67. Therefore, it would have been an obvious matter of design choice to modify the spatial feature comparison method of Donelly et al by having a plurality of comparison output values using logical AND operations and summing the comparison output values to determine a confidence level measure as explained by Donelly et al in the comparator circuit, since the Applicant has not disclosed that a plurality of comparison output values using logical AND operations solves any stated problem or is for any particular purpose and it appears that the method of Donelly et al would perform equally well in comparing the spatial features.

e. Summing the plurality of comparison output values to determine a confidence level measure representing a correlation error between the spatial features of the known and determined set is explained is not explicitly explained by Donelly et al. A summation of the plurality of comparison output values is explained by Donelly et al, corresponding to part d of this claim. Furthermore, Donelly et al explain in column 18, line 51 to column 19, line 10 and in table 4 (column 17, lines 45-53) that the position information of the detected templates is used in order to determine whether a predetermined mark has been detected. The template locations, A and B, are used to determine whether the detected spatial relationship between the marks corresponds to the known spatial relationship between the marks (as illustrated in figure 10). Therefore, |A-

B| in the x-axis and y-axis correspond to the claimed correlation error between the spatial features of the known and determined set of features.

f. Detecting the predetermined mark on the basis of the confidence level measure is explained by Donelly et al in column 19, lines 1-10. Donelly et al explain that if the difference between A and B in the x-axis is less than or equal to εx and the difference between A and B in the y-axis is less than or equal to εy, then a match is determined to have occurred. Therefore, εx and εy correspond to thresholds that determine whether a predetermined mark has been detected.

Referring to claims 61, 64, and 68,

a. An input means for receiving a plurality of one-dimensional arrays of pixel values of the image is illustrated by Donelly et al in figure 27 by the input of the phase data pd_d (162). Donelly et al illustrate the phase data of the input image by one-dimensional rows of pixels in figure 23.

b. A foreground adder means for generating a plurality of partial sums of the foreground pixels, wherein each partial sum of the foreground pixels corresponds to an application of a slice of the mask is illustrated by Donelly et al in figure 28 by the partial sums 238, 259, 253, 266, 258, and 252. Donelly et al explain that each of these partial sums is latched so that they can be tallied in column 13, lines 16-28.

c. A background adder means for generating a plurality of partial sums of the background pixels, wherein each partial sum of the background pixels corresponds to an application of a slice of the mask is illustrated by Donelly et al in figure 28 by the partial sums 238, 259, 253, 266, 258, and 252. The comparator array (165) inherently includes

foreground and background pixels and therefore, by comparing and summing the matching pixels between a comparator array and an input image, the number of matching background pixels will inherently be accumulated.

d. A foreground accumulator network providing a total foreground count of the plurality of partial sums for a predetermined number of input array pixels is explained by Donelly et al in column 12, lines 33-51 and illustrated in figure 27 by the tally arrays, which accumulate the total number of matching pixels of each column of the input image data.

e. A background accumulator network providing a total background count of the plurality of partial sums for a predetermined number of input array pixels is illustrated by Donelly et al in figure 27 by the tally arrays 186-189. These tally arrays may be used to accumulate the number of background pixels matching between an input image and a comparator array.

f. A thresholding means for thresholding the total foreground count and the total background count against first and second predetermined thresholds and outputting a value reflecting each threshold comparison is illustrated by Donelly et al in figure 33 and explained in column 13, lines 40-50. Each of the "X" values corresponds to areas where the accumulation of matching pixels resulted in positive results (explained in column 13, lines 16-28). In order to determine "X", it is inherent that a threshold must have been used to indicate whether a tally produced positive or negative results. Therefore, the "X" values correspond to foreground regions and the zero values correspond to background regions.

g. A determining means for determining from each output value whether or not the predetermined value is detected is explained by Donelly et al in column 13, lines 40-45. Donelly et al explain that a match is determined to occur when a diagonal of template matches is determined to occur. The template matches correspond to positive accumulation results from the accumulating means of Donelly et al.

Referring to claim 67,

a. Providing a plurality of one-dimensional arrays of pixel values of an image corresponds to claim 61a.

b. Generating a plurality of partial sums of on pixel values for a current one dimensional array of pixel values which match with an on cell of the reference pattern of a slice mask corresponds to claim 61b, where on cells correspond to foreground pixels.

c. Thresholding the accumulated partial sums against a predetermined threshold value and determining whether or not the predetermined pattern is detected corresponds to claim 61f-g.

Referring to claims 62 and 69, each scan line having a plurality of pixel values and the one dimensional array comprising of a predetermined number of pixel values of corresponding locations of a plurality of adjacent scan lines is illustrated by Donelly et al in figure 28. Each scan lines (265, 246, or 228) comprise of a predetermined number of pixels and are adjacent to each other.

Referring to claim 63, the apparatus forming a pipeline circuit for pipelining the sequences of one-dimensional arrays is illustrated by Donelly et al in figure 28 by the individual

accumulation of matches in each column represented by reference numbers 238, 259, 253, 266, 258, and 252.

Referring to claims 65 and 70, the foreground pixels being pixels having one color selected from a first set of color values and the background pixels being pixels having one color selected from a predetermined set of color values is illustrated by Donelly et al in figure 7A-7D. The black pixels correspond to foreground pixels and the white pixels correspond to background pixels.

Referring to claim 66, each cell of the slice of the mask corresponding to a pixel value of the one-dimensional array is explained by Donelly et al in column 12, lines 33-51 as the comparator array is explained to be the template data stored. Therefore, each cell of the template corresponds a cell of the one-dimensional array used to compare the input image with the templates.

8. Claims 2-3, 5-6, 8, 10-11, and13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Donelly et al in view of Inaoka et al (U.S. Patent No. 6,351,550).

Referring to claims 2, 5, and 10, the spatial features indicating the angular distribution about a predetermined origin for each mark is not explicitly explained by Donelly et al. However, Inaoka et al do explain an angular distribution of detected elements about an origin in column 20, lines 9-22 and illustrates such a distribution in figure 22d. The angles α and β are determined from a predetermined origin and are used to determine whether the extracted feature points of a target bill correspond to those of a reference bill. To determine the authenticity of a document using several detection elements, it is well known in the art to determine a relationship between the elements to reduce the probability of a false detection. Therefore, it would have

been obvious to one of ordinary skill in the art at the time the invention was made to use the angular distribution of multiple detected elements to determine the authenticity of a document.

Referring to claims 3, 6, and 11, the angular distribution comprising of a signature indicating a discrete angular distribution is not explained by Donelly et al, but is illustrated by Inaoka et al in figure 22d. The angles α and β are discrete angles as the angles determined by the CPU (15) are not exact. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use discrete angles, as any angle that is calculated is not exact and would therefore be discrete.

Referring to claims 8 and 13, comparing the signature of the determined spatial feature with a corresponding signature of a known mark is not explained by Donelly et al, but is explained by Inaoka et al. Inaoka et al explain that the angles and distances between the four feature points extracted from the reference bill are calculated by the CPU (15) in column 20, lines 9-22. Then, Inaoka et al explain that the same information is computed from the target bill in column 20, lines 23-30. Finally, the positional data of the target bill is compared with the known position data of the reference bill to determine whether the reference points correspond to each other, as explained by Inaoka in column 20, lines 31-39. Comparison of two signatures, or spatial data, is common in the art to determine whether two documents correspond to each other. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to compare the signature of a document, which is input to a signature of a known mark to determine whether the input document contains the known mark.

Conclusion

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Hussein Akhavannik whose telephone number is (703)306-4049. The examiner can normally be reached on M-F 8:30-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Leo H. Boudreau can be reached on (703)305-4706. The fax phone number for the organization where this application or proceeding is assigned is (703)872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703)305-3900.

Hussein Akhavannik H.A.
January 20, 2004

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